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Stephan A. Pendorf
Pendorf & Cutliff
5111 Memorial Highway
Tampa, FL 33634-7356

| EXAMINER | |
|---|---|
| ARNOLD, ERNST V | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1616 | |

DATE MAILED: 02/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/689,221 | BERGER ET AL. | |
| | Examiner | Art Unit | |
| | Ernst V. Arnold | 1616 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) *14-21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/19/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

The Examiner acknowledges receipt of Applicant's response to the restriction requirement filed on 12/30/05. Applicant elected Group I, claims 1-13 with traverse. Applicant argued that the hydroxyapatite is not within the crystal phases of part b) of claim 1; namely $Ca_2KNa(PO_4)_2$, $Ca_{10}Na(PO_4)_7$, and $Ca_{10}K(PO_4)$. Also, Applicant argued that the composition made by mixing hydroxyapatite and $CaHPO_4$ to make a biocement would not include a key component of the instant invention; namely diphosphates such as $Na_2CaP_2O_7$, $K_2CaP_2O_7$, and $Ca_2P_2O_7$. The Examiner has carefully considered these arguments. However, the Examiner maintains that the instant composition can be made by a reasonable alternative method; namely *separately* preparing $Ca_2K_{1-x}Na_{1+x}(PO_4)_2$, where x= 0.1 to 0.9, $Ca_{10}Na(PO_4)_7$, $Ca_{10}K(PO_4)_7$; adding the proper amount of $Na_2CaP_2O_7$, $K_2CaP_2O_7$, $Ca_2P_2O_7$, $NaPO_3$, $KPO_3$ and mixtures thereof to arrive at the instantly specified ratios and mixing the powder. Therefore, the restriction requirement is maintained and made final.

### *Priority*

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claims 1-13 are presented for examination on the merits. Claims 14-21 are withdrawn from consideration as being drawn to non-elected subject matter.

Applicant is advised of the use of proper Markush language in instant claim 2 which reads more clearly as: ...by weight chain phosphates selected from the group consisting of...

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-13 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for combining specific amounts of CaO, $P_2O_5$, $Na_2O$, $K_2O$, MgO and $SiO_2$, homogenizing and drying the mixture and subjecting it to a step by step thermal treatment lasting 1-2 h at 350-450 C, 750-850 C, and 950-1050 C respectively, melting the mixture at between 1550 and 1650 C holding at the melting temperature for between 10 and 60 minutes and finally cooling the mixture in a spontaneous or temperature controlled manner and then grinding it to a specific particle range ([00034]), does not reasonably provide enablement for melting and grinding any powder and obtaining the proper $^{31}$P-NMR and X-ray diffraction measurements. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims.

The factors to be considered in determining whether a disclosure meets the enablement requirement of 35 U.S.C. 112, first paragraph, have been described in In re

Wands, 8 USPQ2d 1400 (Fed. Cir. 1988). Among these factors are: 1) scope or breadth of the claims; 2) nature of the invention; 3) relative level of skill possessed by one of ordinary skill in the art; 4) state of, or the amount of knowledge in, the prior art; 5) level or degree of predictability, or a lack thereof, in the art; 6) amount of guidance or direction provided by the inventor; 7) presence or absence of working examples; and 8) quantity of experimentation required to make and use the claimed invention based upon the content of the supporting disclosure. When the above factors are weighed, it is the Examiner's position that one skilled in the art could not practice the invention without undue experimentation.

1) Scope or breadth of the claims

The claims are broader in scope than the enabling disclosure. The specification discloses that combining specific amounts of CaO, $P_2O_5$, $Na_2O$, $K_2O$, MgO and $SiO_2$, homogenizing and drying the mixture and subjecting it to a step by step thermal treatment lasting 1-2 h at 350-450 C, 750-850 C, and 950-1050 C respectively, melting the mixture at between 1550 and 1650 C holding at the melting temperature for between 10 and 60 minutes and finally cooling the mixture in a spontaneous or temperature controlled manner and then grinding it to a specific particle range ([00034]), does not reasonably provide enablement for melting and grinding any powder and obtaining the proper $^{31}$P-NMR and X-ray diffraction measurements. However, Applicant is purporting to use any powder and analyze the products with $^{31}$P-NMR and X-ray diffraction.

2) Nature of the invention

The nature of the invention is directed to a powder mixture for resorbable calcium phosphate biocement.

3) Relative level of skill possessed by one of ordinary skill in the art

The relative level of skill possessed by one of ordinary skill in the art of medical research is relatively high, as a majority of lead investigators conducting scientific research and development in this particular technological area possess an M.D. and/or a Ph.D. in a scientific discipline such as organic synthetic chemistry, medicinal chemistry, biochemistry, pharmacology, biology or the like.

4) State of, or the amount of knowledge in, the prior art

The art of calcium phosphate mineral biocements is extensive. The art teaches the instantly claimed components in the composition (DE 19744809 C1).

5) Level or degree of predictability, or a lack thereof, in the art

The level of predictability on the chemical make up of a powder made from a myriad of available powders is low. One of ordinary skill in the art would not be able to predict the chemical makeup and would have an undue burden of experimentation in mixing powders of all types and analyzing each and every resulting composition with $^{31}$P-NMR and X-ray diffraction

6) Amount of guidance or direction provided by the inventor

Applicant was required to provide in the specification additional guidance and direction with respect to how use the claimed subject matter in order for the application to be enabled with respect to the full scope of the claimed invention. Although the

instant specification discloses that combining specific amounts of CaO, $P_2O_5$, $Na_2O$, $K_2O$, MgO and $SiO_2$, homogenizing and drying the mixture and subjecting it to a step by step thermal treatment lasting 1-2 h at 350-450 C, 750-850 C, and 950-1050 C respectively, melting the mixture at between 1550 and 1650 C holding at the melting temperature for between 10 and 60 minutes and finally cooling the mixture in a spontaneous or temperature controlled manner and then grinding it to a specific particle range ([00034]), does not reasonably provide enablement for melting and grinding any powder and obtaining the proper $^{31}$P-NMR and X-ray diffraction measurements, it remains silent on the use of all powders.

7) Presence or absence of working examples

The specification provides scientific data and working embodiments with respect to a specific powder and method of making the biocement ([00034]).

8) Quantity of experimentation required to make and use the claimed invention based upon the content of the supporting disclosure

As a result, one of ordinary skill in the art would be required to conduct an undue amount of experimentation to reasonably and accurately determine whether the composition and corresponding method of the instant application does in fact work for all powders.

In conclusion, it is readily apparent from the aforementioned disclosure, in conjunction with a corresponding lack of scientific data and working embodiments regarding the use of all powders, that one of ordinary skill in the art would therefore be required to conduct an undue amount of experimentation to reasonably and accurately

extrapolate whether said powder would actually meet the $^{31}$P-NMR and X-ray diffraction limitations.

For purposes of examination, the Examiner will interpret the claims as they read upon a composition.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over DE 19744809 C1 in view of Gross et al. (US 4,239,113) and Broemer et al. (US 3,922,155) and Constantz et al. (US 6,002,065).

The Abstract of DE 19744809 C1 discloses a porous rapidly soluble glass ceramic comprising $Ca_2KNa(PO_4)_2$, $Ca_5Na_2(PO_4)_2$ or $Ca_6Na_3(PO_4)_5$ as the main crystal phase which is useful as a resorbably bone substitute, a substrate for drugs (e.g., antibioitics), proteins, enzymes or cells or a filter aid. Claim 7 of DE 19744809 C1 clearly claims a composition comprising (wt%):

| | |
|---|---|
| 30-50 | $P_2O_5$ |
| 20-55 | CaO |
| 5-25 | $Na_2O$ |
| 0.01-20 | $K_2O$ |
| 0-15 | MgO |
| 0-10 | $SiO_2$ |

The composition reads upon instant claim 7. It is the Examiner's position that heat melting these materials will intrinsically form the instantly claimed phosphate mixtures in instant claim 1 including an amorphous phase, which makes up 0.1 to 65% by weight and 0.1-15% by weight chain phosphates. In addition, since magnesium is present in the composition, then it is reasonable to assert that mixed crystals would intrinsically form in the ceramic material.

I. The Abstract of DE 19744809 C1 does not expressly disclose the powder mixture with 40-99% by volume of powder having a particle size of 0.1-10 μm; 1-20% by volume of a powder having a particle size of 10-43 μm; 0-59% by volume of having a particle size of 43-315 μm.

II. The Abstract of DE 19744809 C1 does not expressly disclose the addition of alpha- or beta-tricalcium phosphate to the powder mixture.

III. The Abstract of DE 19744809 C1 does not expressly disclose the powder mixture in the form of an aqueous solution, a suspension or a paste.

IV. The Abstract of DE 19744809 C1 does not expressly disclose a two component kit wherein one component is the powder and the other component is made up of a water phase.

I. Gross et al. teach a composition for the preparation of a bone cement wherein the bioactive glass ceramic powder has a particle size of 10-200 micrometers. The glass ceramic powder is the same as that disclosed in US 3,922,155.

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to use ceramic powders of 10-200 micrometer particle size as a bone cement.

One of ordinary skill in the art would have been motivated to do this because Gross et al. teach that such cements have advantageous processing characteristics, good mechanical properties and characteristics favorable to the development of bone structure (Column 2, lines 10-16).

II. Broemer et al. teach a glass ceramic material comprising $SiO_2$, $P_2O_5$, $Na_2O$, $K_2O$, MgO and CaO useful as bone and tooth replacement material (Abstract). Broemer et al. teach that calcium orthophosphate, $Ca_3(PO_4)_2$, otherwise known as tri-calcium phosphate or tertiary calcium phosphate, can be added to the composition at about 10 to about 30 percent by weight (Column 4, lines 1-2, column 5, Table 1 and claim 1). Broemer et al. discloses the leaching out of a preferred glass ceramic material with Ringer's solution in Figure 1 (Column 5, lines 1-2).

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to add tricalcium phosphate to the composition of DE 19744809 C1 as suggested by Broemer et al. for the purpose of making a biocompatible bone cement and produce the instant invention.

One of ordinary skill in the art would have been motivated to do this because Broemer et al. report that the composition has the advantages of biocompatibility and the materials can be worked mechanically to form molds (Column 9, lines 64-column 10, lines 1-22).

III and IV. Constantz et al. teach calcium phosphate cement compositions and kits for preparing a calcium phosphate mineral for use in bone defects and dental applications (Abstract; column 2, lines 46-55; and claims 1-10). Constantz et al. teach the mixing of solutions of the cement in order to measure the setting time (Column 10, Example 3, for example). Constantz et al. teach a kit for preparing a calcium phosphate mineral wherein the dry ingredients and the aqueous solution are present in separate containers (Claims 1, 4 and 8). The Examiner interprets this to read upon a 2-compartment kit.

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to provide the powder mixture in the form of a aqueous solution, a suspension or a paste.

One of ordinary skill in the art would have been motivated to do this because it would have been routine to mix the powder in a solution and measure the amount of time it took for the cement to cure after application; an important piece of information for the orthopedic surgeon applying the bone cement to a patient.

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to put the composition of DE 19744809 C1 in a kit as suggested by Constantz et al. and produce the instant invention.

One of ordinary skill in the art would have been motivated to do this because a kit would enhance the ease of use of the composition for the practitioner applying the cement and would enhance the marketing value of the product.

The relative amount of orthophosphates, 40-95% or 50-90% by weight, and diphosphates, 1 to 22% or 5-22% by weight, is deemed merely a matter of routine optimization of standard working conditions, which is well within the purview of one of ordinary skill in the art.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the claimed invention, as a whole, would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made, because every element of the invention and the claimed invention as a whole have been fairly disclosed or suggested by the combined teachings of the cited references.

***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., In re Berg, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); In re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); In re Van Ornum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); In re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and In re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

I. Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/689,219 in view of Gross et al. (US 4,239,113). The copending application teaches the same $^{31}$P-NMR and X-ray diffractometric measurements to identify the composition with overlapping ranges of orthophosphate, diphosphate and amorphous components. One of ordinary skill in the art would have recognized the obvious variation of the instant application over the copending application because Gross et al. teaches the use of particles from 10-200 microns in size for bone cement compositions.

This is a provisional obviousness-type double patenting rejection.

II. Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/689,217 in view of Gross et al. (US 4,239,113). The copending application teaches the same $^{31}$P-NMR and X-ray diffractometric measurements to identify the composition with overlapping ranges of orthophosphate, diphosphate and amorphous components. One of ordinary skill in the art would have recognized the obvious variation of the instant application over the copending application because Gross et al. teaches the use of particles from 10-200 microns in size for bone cement compositions.

This is a provisional obviousness-type double patenting rejection.

***Conclusion***

No claims are allowed.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ernst V. Arnold whose telephone number is 571-272-8509. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sreeni Padmanabhan can be reached on 571-272-0629. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EVA

JOHN PAK
PRIMARY EXAMINER
GROUP 1600